Abstract:
Objective To determine the efficacy of extracorporeal shock-wave lithotripsy (SWL) in the treatment of lower ureteric calculi.
Materials and methods Patients with lower ureteric calculi selected for treatment by SWL from July 2006 to June 2011 were analyzed retrospectively. Outcomes assessed were stone clearance, complications and retreatment including the need for ureteroscopy. Complications like sepsis, hydronephrosis and deterioration of renal function were documented. Indications for ureteroscopy included failure of fragmentation and failure to clear fragments at follow up.
Results A total of 59 patients were studied. There were 51 males and 8 females with age ranging from 19 - 74 years (mean age 43 years). Thirty seven patients had left sided calculi, 21 right sided and one patient had bilateral lower ureteric calculi. The size of the calculi ranged from 5 to 15 mm (mean size 8.44 mm). The number of shocks ranged from 2000 to 8000 (mean no. of shocks 4449). The duration of follow up varied from 2 to 30 days (mean 11.4 days). Ureteroscopy was required in 11 patients. 44 of patients with stone size in the range 11-15 mm required ureteroscopy. Of the 11 patients, six had ureteroscopy for failure to fragment and five for failure of clearance. There was no reported UTI or deterioration of renal function during the study.
Conclusion SWL is a safe effective treatment for lower ureteric calculi of size less than 10 mm. But for larger stones (10mm), the rates of failure and need for intervention is higher.
Keyword : Extra-corporeal shock wave lithotripsy (SWL), lower ureteric calculus, ureteroscopy

INTRODUCTION:
Ureteroscopy is the gold standard for management of distal third ureteric calculi. The stone free rates with the use of fine ureteroscope and Holmium laser is close to 100% after a single treatment [1]. However, ureteroscopy is dependent on the operation theatre availability and it requires anaesthesia. Postoperatively, patients may require admission and/or additional
procedures like stent removal [2]. New-generation lithotripters can effectively be used as an outpatient procedure, with treatment often being delivered with only oral analgesia or short-acting intravenous sedation. Newer generation machines produce less energy in a smaller focus than HM-3 (first-generation) machine, with the drawback of lower success rate. In this study, we examined our experience with the Dornier Compact Delta II lithotripter in the management of patients with stones in the distal third of the ureter. The Compact Delta II is equipped with electromagnetic shockwave generator.

MATERIALS AND METHODS:
Patients with lower ureteric calculi of 15 mm or less in size were selected for treatment with shockwave lithotripsy (SWL). Data was collected retrospectively from hospital records of patients treated from July 2006 to June 2011 and were analyzed. X-ray KUB and IVU were done in all patients. Post operatively, patients were assessed with ultrasonography, tomogram or KUB plain film to monitor fragmentation and clearance of fragments. Stone size was calculated by measuring the largest diameter of stone on KUB plain film. Patients were treated in prone position with full bladder. They received 2000 shocks per session at a frequency of 70 shocks/min at energy level of 14kV. Treatment was constantly monitored by fluoroscopy or ultrasonography. The total no. of shocks required was decided based on fragmentation of stone during lithotripsy. Patients were given analgesia before each session. They were advised to have fluid intake of 2.5-3 L per day and to report even a minor complication after treatment with close follow-up. Complete clearance was defined as no fragments at 3 months, radiologically. Incomplete clearance was defined as having stone fragments of 5 mm or larger size. Outcome was assessed by stone clearance, complications, need for ureteroscopy. Complications like sepsis, hydronephrosis and deterioration of renal function were recorded. Ureteroscopy was done in case of failure of stone fragmentation, failure to clear fragments or patient’s choice due to prolonged time.

RESULTS:
From July 2006 to June 2011, a total of 59 patients underwent shockwave lithotripsy for distal ureteric calculus. There were 51 males and 8 females. Mean age was 43 years (ranges from 19 - 74 years). All patients had unilateral distal third ureteric calculus except one patient, who had bilateral distal ureteric calculi. Mean size of calculi was 8.44 mm (ranges from 5 to 15 mm). Four patients had calculi less than 5 mm size, 46 patients had stone size 6-10 mm and nine patients had stone size between 11-15 mm. During treatment, mean no. of shocks were 4450 (ranged from 2000 to 8000). Patients were followed for a mean of 11 days (ranged from 2 to 30 days).

Ureteroscopy was required in 11 patients. Of 11 patients, six had ureteroscopy for failure to fragment and in five patients, calculi failed to clear despite adequate fragmentation. Two patients underwent DJ stenting following ureteroscopy. 44% patients with stone size 11-15 mm required ureteroscopy as compared to 19.5% of patients with stone sizes 6-10 mm. There was no UTI or deterioration of renal function during the study.
DISCUSSION:
Pettersson and Tiselius [3, 4] reported success rates as high as 93% for proximal, 100% for middle and 100% for distal ureteric stones using the HM-3 lithotripter. The outcome of SWL for ureteral stones in all sites remains variable and machine specific. The Dornier HM-3 remains the most effective lithotripter for stones in all locations, including the distal ureter, with stone-free rates ranging from 69% [5] to 96% [6] and most patients become stone free after a single session. A randomized trial has shown the HM3 to be as effective as ureteroscopy but more than 30% patients required general anaesthesia [7].

Although, the third-generation lithotripters are more user friendly, they have not been able to match the success of the HM-3. The stone free rates after single treatment is commonly in the vicinity of 50%. [8, 9] Our results with the Dornier Compact Delta II lithotripter are comparable to those obtained with other third-generation machines. Just over half the patients are cleared of their stones with a single outpatient session. For those patients in whom the initial treatment is not successful, a second session will be equally effective and will clear stones from just over half of these patients. The second session is much more likely to be effective if the stone has shown some response to the initial treatment.

The efficacy of shock wave lithotripsy at slower rate (70 to 80 shocks per minute) is better than at faster rate (120 shocks per minute) [10]. We have also utilised the same policy of treating patients at slower rate (70 shocks per minute).

The efficacy of adjunctive Tamsulosin therapy in enhancing stone clearance was assessed in patients with renal and ureteric stones following SWL. Tamsulosin was significantly effective in enhancing stone clearance of sizes 10-24 mm in comparison to placebo (p = 0.03) but not so with smaller stones 6-10 mm size (p = 0.35). Adjunctive Tamsulosin was also effective in reducing painful episodes and requirement of analgesia [11]. The efficacy of Tamsulosin in stone clearance following SWL was further confirmed [12].

The overall complication rate of ESWL is low and majority of them are minor. The most common complication following ESWL is loin pain. It is because of passage of stone fragments downward into the bladder and eventually passing out through urine. Other reported complications are hematuria, fever with flank pain secondary to infected
hydronephrosis. Less commonly, perinephric hematoma and injury to adjacent organs are described. A meta-analysis comparing the safety and efficacy of URS and ESWL showed that URS was superior to ESWL on stone free rate, repeat treatment rate and patients' satisfaction, while the incidence of postoperative complications, operation time and hospital stays of ESWL was lower or shorter than URS. [13] It is well known that ureteroscopy gives a superior stone-free rate with a single treatment.

CONCLUSION:
In our centre, SWL was offered to those patients who were not willing to undergo ureteroscopy. In centres where SWL can be delivered promptly, this modality remains a reasonable option for management of lower ureteral calculi especially of sizes less than 10mm. Its use will avert the need for more invasive treatments in over half the patients.

REFERENCES:


